a micro electromechanical actuator on the micromachined PLC substrate to move and align sender waveguide ports relative to a plurality of receiver waveguide ports.

2. (Canceled) ~~The MOEM-WS as cited in claim 1, wherein said micromachined PLC substrate comprising a silicon-on-insulator (SOI) wafer upon which said micromachined PLC and said micro electromechanical actuator being constructed.~~

3. (Currently Amended – Independent Claim) ~~The MOEM-WS as cited in claim 1 further comprises a support substrate, wherein the support substrate being bonded to the said micromachined PLC substrate.~~ A Micro-Opto-Electro-Mechanical Waveguide Switch (MOEM-WS) comprising:

a micromachined planar lightwave circuit (PLC) substrate having at least one integrated optical waveguide fabricated thereto and at least one optical fiber coupled into the integrated optical waveguide;

a micro electromechanical actuator on the micromachined PLC substrate to move and align sender waveguide ports relative to a plurality of receiver waveguide ports; and

a support substrate, wherein said support substrate being donded to said micromachined PLC substrate.

4. (Original) The MOEM-WS as cited in claim 1, providing 1-input/N-output (1XN) fiber switching or N-input/1-output (NX1) fiber switching, wherein the port number N being any positive integer numbers and being determined by the number of waveguide ports on the said micromachined PLC.

5. (Previously Presented) The MOEM-WS as cited in claim 1, wherein said ~~at least one~~ integrated optical waveguide ~~of PLC~~ supporting a single or a plurality of ~~one~~ electromagnetic wave propagation modes along the waveguide and said integrated optical waveguide comprising a core and adjacent cladding composed of silica glass,

polymer, SiON, silicon, or any other optical waveguide materials for electromagnetic wave propagation.

6. (Canceled) ~~The MOEM-WS as cited in claim 1, wherein said at least one integrated optical waveguide of PLC supporting a plurality of electromagnetic wave propagation modes along the waveguide.~~

7. (Canceled) ~~The MOEM-WS as cited in claim 1, wherein said at least one integrated optical waveguide of PLC comprising a core and adjacent cladding, and said core and cladding comprising a glass material.~~

8. (Canceled) ~~The MOEM-WS as cited in claim 1, wherein said at least one integrated optical waveguide of PLC comprising a core and adjacent cladding, and said core and cladding comprising a polymer material or any other types of materials for electromagnetic wave propagation.~~

9. (Previously Presented) The MOEM-WS as cited in claim 1, further comprises a single or a plurality of electrically conductive pathways on said micromachined PLC substrate or said support substrate.

10. (Original) The MOEM-WS as cited in claim 1, further comprising photonic or electronic integrated circuits mounted on said micromachined PLC substrate for optical signal generation/detection or subsequent electronic signal processing.

11. (Previously Presented) The MOEM-WS as cited in claim 1, wherein said micro electromechanical actuator comprising a single or a plurality of moving cantilever flexures, upon which sender or receiver waveguide ports reside, and said micro electromechanical actuator providing a horizontal movement of the sender or receiver waveguide ports relative to the other waveguide ports on the opposite side, wherein the horizontal movement being either linear or angular displacement.

12. (Previously Presented) The MOEM-WS as cited in claim 1, wherein said micro electromechanical actuator utilizing a variety of MEMS side actuation mechanisms including electrostatic, magnetic, thermal, shape memory alloy, impact, ~~and~~ piezoelectric actuations, ~~and~~ or any other applicable MEMS actuation methods.

13. (Previously Presented) The MOEM-WS as cited in claim 1, wherein said micromachined PLC having silicon microgrooves filled with ~~the same~~ a material ~~for~~ substantially similar to said integrated optical waveguide in order to avoid the peeling between integrated optical waveguide layer and the silicon structure layer.

14. (Original) The MOEM-WS as cited in claim 1, wherein said micromachined PLC having tapered waveguide ports to increase the optical signal coupling efficiency and to reduce the alignment accuracy requirements between the movable waveguide port relative to the other waveguide ports on the opposite side, wherein, the tapered waveguide ports being either symmetric or asymmetric.

15. (Original) The MOEM-WS as cited in claim 1, providing a cascaded fiber switch array to expand the scale and functionality of MOEM-WS, wherein a large-scale cascaded fiber switch array comprising a plurality of serially interconnected small-scale fiber switch arrays on a single substrate.

16. (Previously Presented) The MOEM-WS as cited in claim 1, ~~providing a full-duplex fiber switch,~~ wherein said micromachined PLC comprising ~~dual-channel~~ a single or a plurality of optical waveguides at both ports of sender and receiver waveguides for concurrent forward, ~~and~~ backward, ~~signal propagation in order to support~~ bi-directional, ~~and~~ or full-duplex signal transmissions.

17. (Original) The MOEM-WS as cited in claim 1, providing a 2-input/2-output crossbar fiber switch, wherein said micromachined PLC comprising three waveguide channels at both sender and receiver waveguide ports, and further wherein, one of the receiver

waveguide port being looped back into the appropriate sender waveguide port in order to construct "bar" and "cross" states.

18-23. Canceled

24. (New) The MOEM-WS as cited in claim 1, providing fiber to waveguide optical switch, wherein said micro electromechanical actuator to move and align a single or a plurality of optical fibers relative to a single or a plurality of said integrated optical waveguide.

25. (New) The MOEM-WS as cited in claim 1, said integrated optical wavguide or said optical fiber being coated with antireflection films, and further wherein, a space bweteen waveguide ports being filled with air, inert gas, or index-matching fluid.

26. (New) The MOEM-WS as cited in claim 1, wherein said integrated optical waveguide further comprising a single or a plurality of tilted waveguide end facet in order to reduce back-reflections, and further wherein, said sender waveguide ports being properly shifted relative to said receiver waveguide ports to compensate offsets or displacements of transmitted signal from said tilted waveguide end facet.

27. (Previously Presented) The MOEM-WS as cited in claim 3, providing 1-input/N-output (1XN) fiber switching or N-input/1-output (NX1) fiber switching, wherein the port number N being any positive integer numbers and being determined by the number of waveguide ports on the said micromachined PLC.

28. (Previously Presented) The MOEM-WS as cited in claim 3, wherein said integrated optical waveguide supporting a single or a plurality of electromagnetic wave propagation modes along the waveguide and said integrated optical waveguide comprising a core and adjacent cladding composed of silica glass, polymer, SiON, silicon, or any other optical waveguide materials for electromagnetic wave propagation.

29. (Previously Presented) The MOEM-WS as cited in claim 3, further comprises a single or a plurality of electrically conductive pathways on said micromachined PLC substrate or said support substrate.

30. (Previously Presented) The MOEM-WS as cited in claim 3, further comprising photonic or electronic integrated circuits mounted on said micromachined PLC substrate for optical signal generation/detection or subsequent electronic signal processing.

31. (Previously Presented) The MOEM-WS as cited in claim 3, wherein said micro electromechanical actuator comprising a single or a plurality of moving cantilever flexures, upon which sender or receiver waveguide ports reside, and said micro electromechanical actuator providing a horizontal movement of the sender or receiver waveguide ports relative to the other waveguide ports on the opposite side, wherein the horizontal movement being either linear or angular displacement.

32. (Previously Presented) The MOEM-WS as cited in claim 3, wherein said micro electromechanical actuator utilizing a variety of MEMS side actuation mechanisms including electrostatic, magnetic, thermal, shape memory alloy, impact, piezoelectric actuations, or any other applicable MEMS actuation methods.

33. (Previously Presented) The MOEM-WS as cited in claim 3, wherein said micromachined PLC having silicon microgrooves filled with a material substantially similar to said integrated optical waveguide in order to avoid the peeling between integrated optical waveguide layer and the silicon structure layer.

34. (Previously Presented) The MOEM-WS as cited in claim 3, wherein said micromachined PLC having tapered waveguide ports to increase the optical signal coupling efficiency and to reduce the alignment accuracy requirements between the

movable waveguide port relative to the other waveguide ports on the opposite side, wherein, the tapered waveguide ports being either symmetric or asymmetric.

35. (Previously Presented) The MOEM-WS as cited in claim 3, providing a cascaded fiber switch array to expand the scale and functionality of MOEM-WS, wherein a large-scale cascaded fiber switch array comprising a plurality of serially interconnected small-scale fiber switch arrays on a single substrate.

36. (Previously Presented) The MOEM-WS as cited in claim 3, wherein said micromachined PLC comprising a single or a plurality of optical waveguides at both ports of sender and receiver waveguides for concurrent forward, backward, bi-directional, or full-duplex signal transmissions.

37. (Previously Presented) The MOEM-WS as cited in claim 3, providing a 2-input/2-output crossbar fiber switch, wherein said micromachined PLC comprising three waveguide channels at both sender and receiver waveguide ports, and further wherein, one of the receiver waveguide port being looped back into the appropriate sender waveguide port in order to construct "bar" and "cross" states.

38. (New) The MOEM-WS as cited in claim 3, providing fiber to waveguide optical switch, wherein said micro electromechanical actuator to move and align a single or a plurality of optical fibers relative to a single or a plurality of said integrated optical waveguide.

39. (New) The MOEM-WS as cited in claim 3, said integrated optical wavguide or said optical fiber being coated with antireflection films, and further wherein, a space bweteen waveguide ports being filled with air, inert gas, or index-matching fluid.

40. (New) The MOEM-WS as cited in claim 3, wherein said integrated optical waveguide further comprising a single or a plurality of tilted waveguide end facet in order to reduce back-reflections, and further wherein, said sender waveguide ports being

properly shifted relative to said receiver waveguide ports to compensate offsets or displacements of transmitted signal from said tilted waveguide end facet.